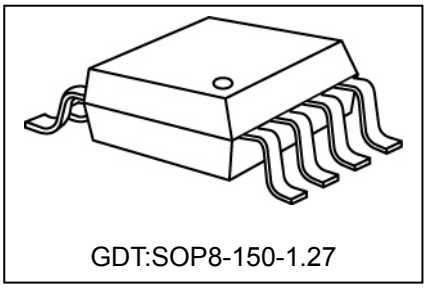
Power switch for scan type LED display

Features

- Power switch for scan type LED display
- Eliminate upper-ghosting
- Eliminate high contrast interference without additional circuit
- No color stripe when shorted LED
- Operating voltage from 5V to 3.3V
- 2 output channels, 2A output current per channel
- SOP-8 package available
- Package MSL level:3



GDT:SOP8-150-1.27

Product Description

MBI5907 is a specific power switch for scan type LED display. It has two output channels, operate from 5V to 3.3V, supports 2A maximum output current per channel.

Moreover, there are internal circuits to eliminate common problems happened in scan type LED display. Such as upper ghosting 、high contrast interference* and color stripe which is caused by shorted LED.

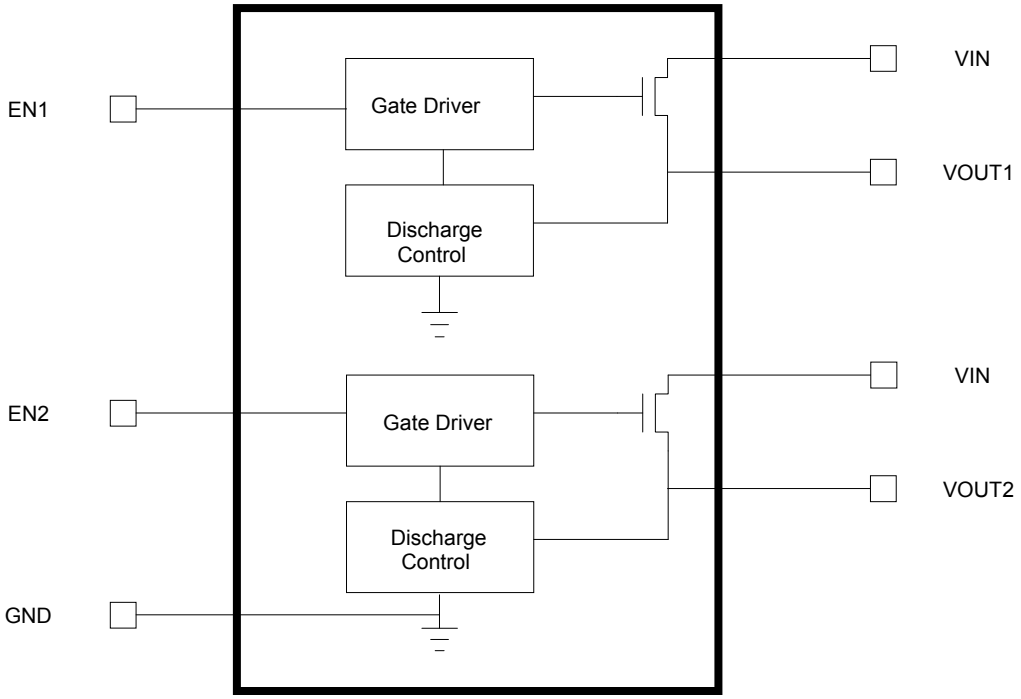
*Function of eliminating high contrast interference requires MBI constant current drivers equipped with grayscale data compensation technology.

Application

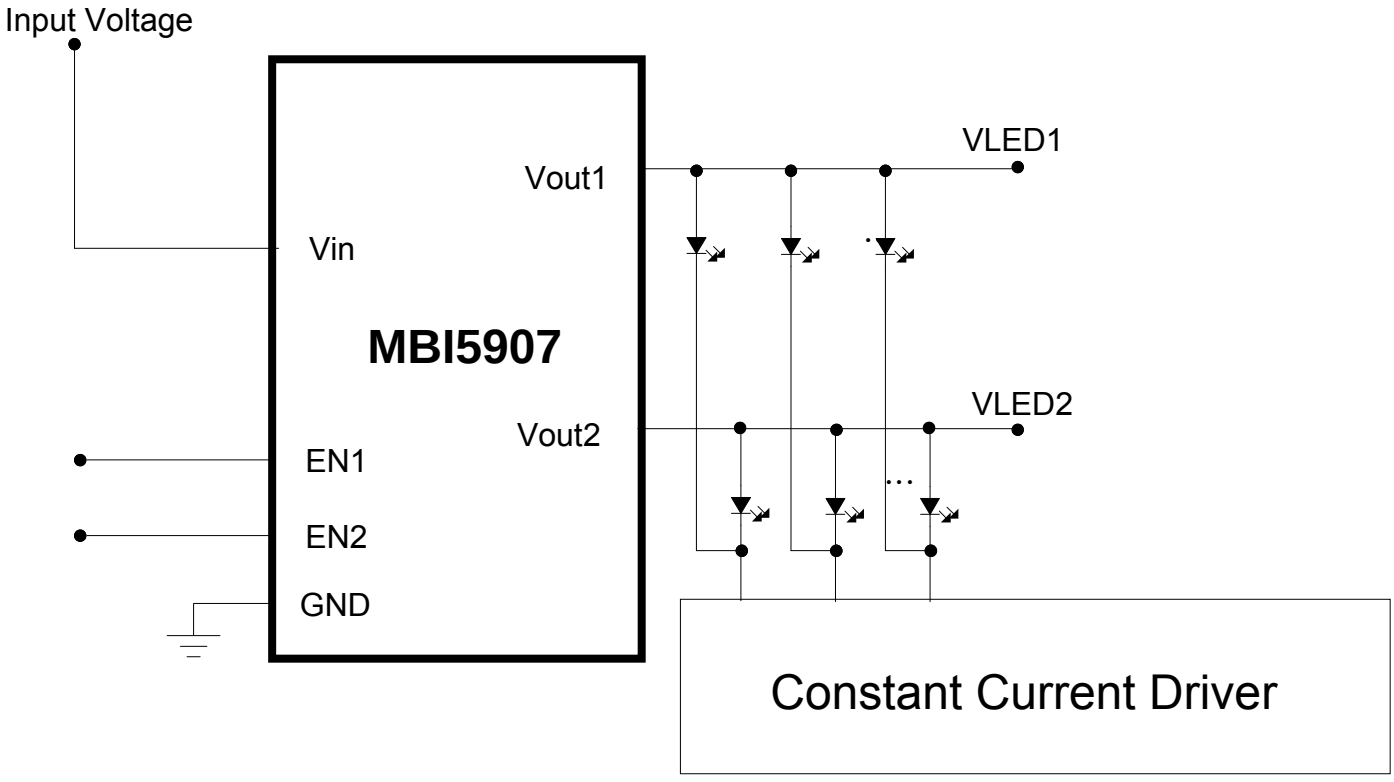
- LED display

6F-4, No.18, Pu-Ting Rd., Hsinchu, Taiwan 30072, R.O.C.
TEL: +886-3-579-0068, FAX: +886-3-579-7534, E-mail: info@mblock.com.tw

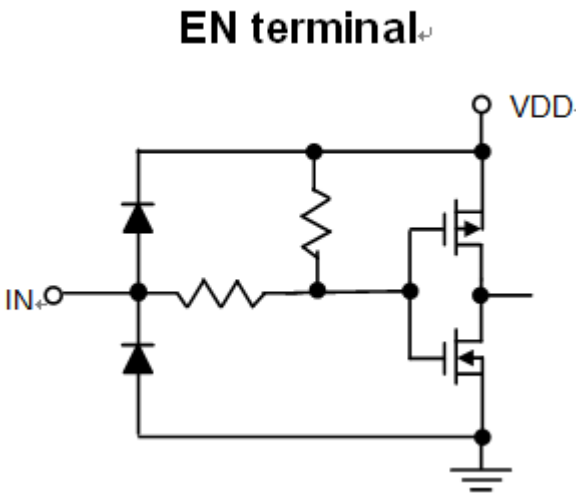
Block Diagram



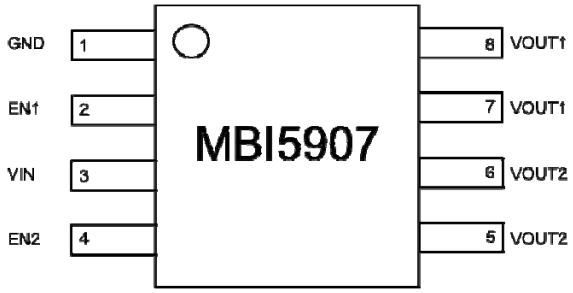
Typical Application Circuit



Equivalent Circuits of Inputs and Outputs



Pin Configuration



MBI5907GDT

Terminal Description

MBI5907

Pin	Name	Description and function
1	GND	Ground
2	EN1	Enable control signal of VIN1(Active Low)
3	VIN	Input voltage terminal
4	EN2	Enable control signal of VIN2(Active Low)
5	VOUT2	Output voltage terminal2
6	VOUT2	Output voltage terminal2
7	VOUT1	Output voltage terminal1
8	VOUT1	Output voltage terminal1

Maximum Rating

Characteristic		Symbol	Rating	Unit
Supply Voltage		VIN1,VIN2	-0.3~6	V
Input Voltage		EN1,EN2	-0.3~6	V
Output Voltage		VOUT1,VOUT2	-0.3~6	V
Output Current per channel		I_{OUT}	2	A
Power Dissipation (On 4 Layer PCB, Ta=25°C)*	GPT package	P_D	0.53	W
Thermal Resistance (On 4 Layer PCB, Ta=25°C)*	GPT package	$R_{th(j-a)}$	188	°C/W
Junction Temperature		$T_{j,max}$	150**	°C
Operating Ambient Temperature		T_{opr}	-40~+85	°C
Storage Temperature		T_{stg}	-55~+150	°C
ESD Rating	MIL-STD-883H Method 3015.8	HBM	Class 3A (4000V ~ 7999V)	-
	ANSI/ESD S5.2-2009	MM	Class M3 (350V)	-

*The PCB size is 76.2mm*114.3mm in simulation. Please refer to JEDEC JESD51.

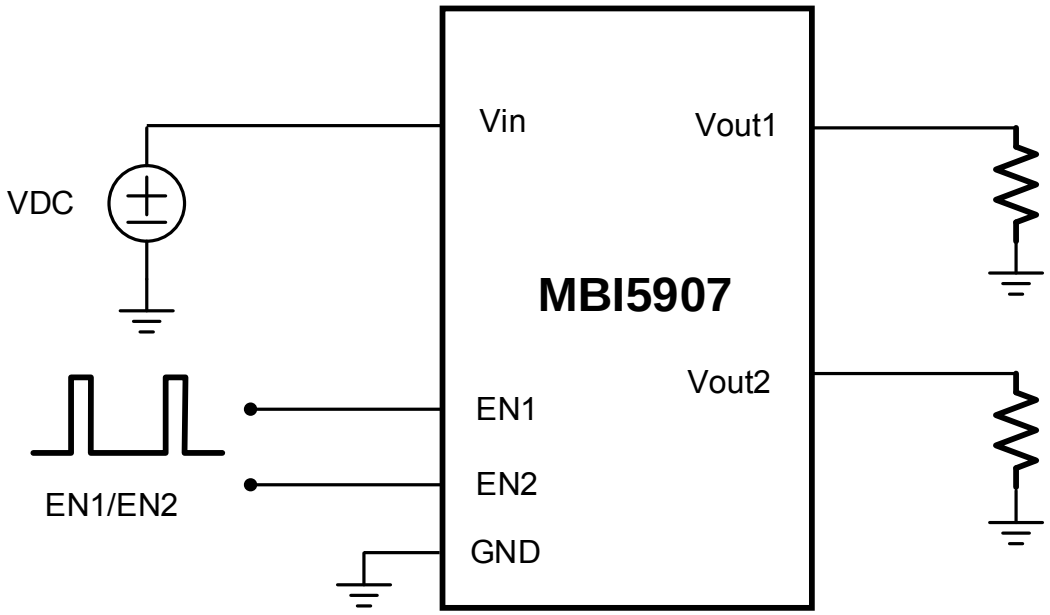
** Operation at the maximum rating for extended periods may reduce the device reliability; therefore, the suggested junction temperature of the device is under 125°C.

Note: The performance of thermal dissipation is strongly related to the size of thermal pad, thickness and layer numbers of the PCB. The empirical thermal resistance may be different from simulative value. Users should plan for expected thermal dissipation performance by selecting package and arranging layout of the PCB to maximize the capability.

Electrical Characteristics (Vin1 = Vin2=5.0V, Ta=25°C)

Characteristics		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Current		I_{DD}	-	0.8	1.1	1.5	mA
Switch On Resistance		$R_{DS(ON)x}$	I_{OUT} = 2A	-	100	-	mΩ
EN Threshold	"H" level	V_{IH}	EN1 / EN2	0.8*V_{DD}	-	V_{DD}	V
	"L" level	V_{IL}	EN1 / EN2	GND	-	0.2*V_{DD}	V
Turn-On Time		t_{ONx}	Enable ON	-	-	200	ns
Turn-Off Time		t_{OFFx}	Enable OFF	-	-	300	ns
Pull-up Resistor		R_{IN}(up)	EN1 / EN2	-	80	-	KΩ

Test Circuit for Electrical Characteristics



Operation Principles

MBI5907 is a dual channel power switch specified for scan type LED display. It integrates two P-MOSFET、gate driver and discharge control circuit. Each P-MOSFET provides 2A maximum current with 100m ohm ON resistance ($R_{DS(ON)}$).

When EN is" LOW", P-MOS will turn on. While EN is "HIGH", P-MOS will turn off. Then discharge control circuit will activate. Discharge circuit will eliminate upper ghosting 、high contrast interference and color stripe of scan type LED display.

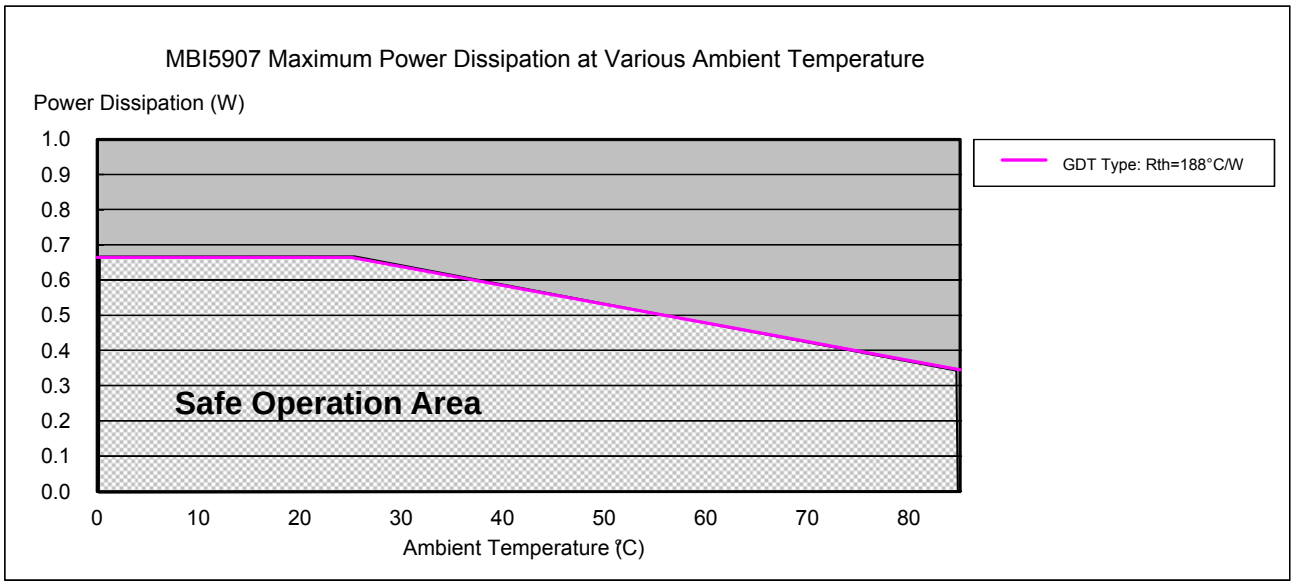
Package Heat Dissipation (P_D)

The maximum heat dissipation, $P_{D(max)}=(T_{j,max}–T_a)/R_{th(j-a)}$, decreases as the ambient temperature increases.

The heat dissipation (P_D) of MBI5907 is calculated by the equation:

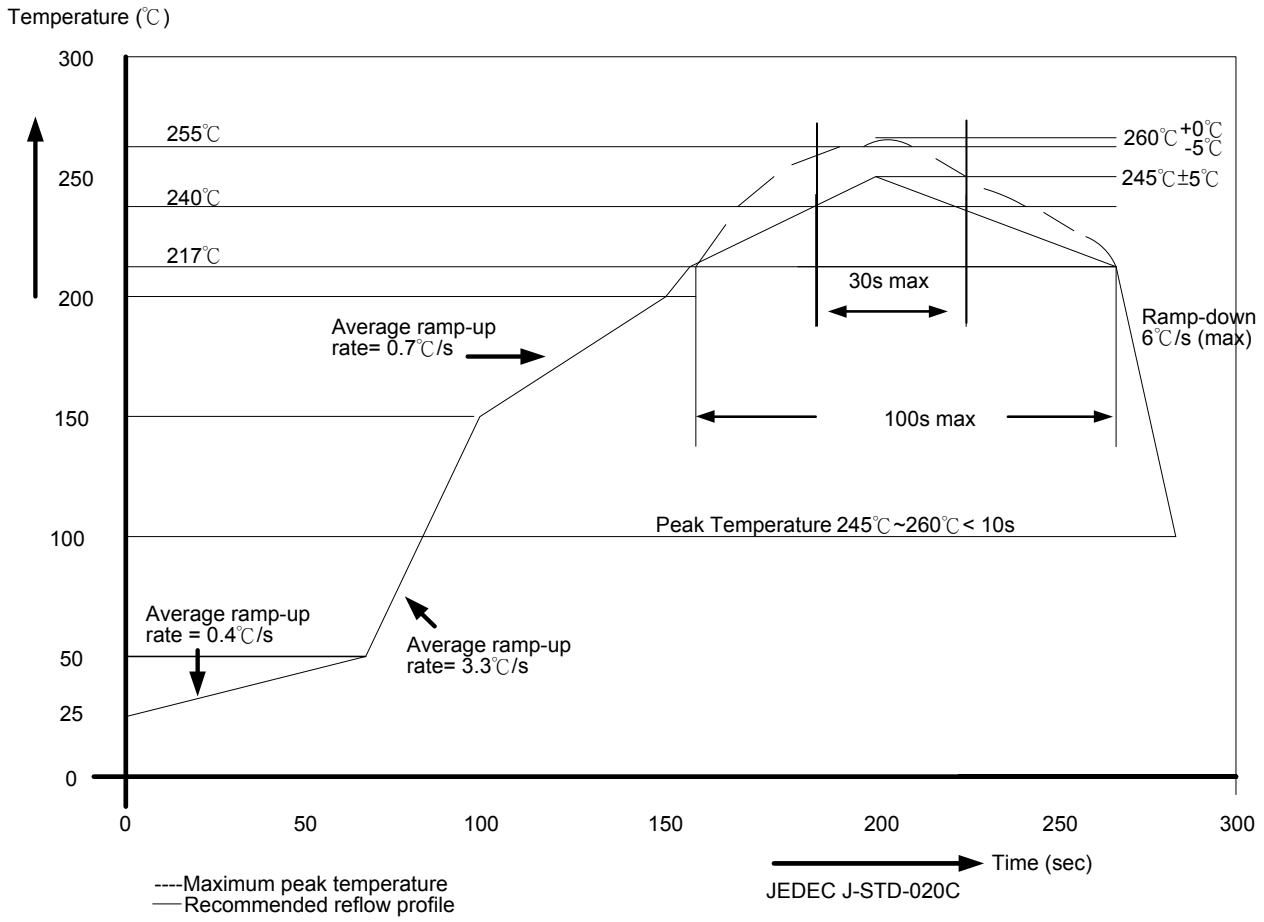
$P_D=(V_{DD}xI_{DD})+(I_{OUT1}xRon1)+(I_{OUT2}xRon2)$

Please refer to the following figure to design within the safe operation area.



Soldering Process of "Pb-free" Package Plating*

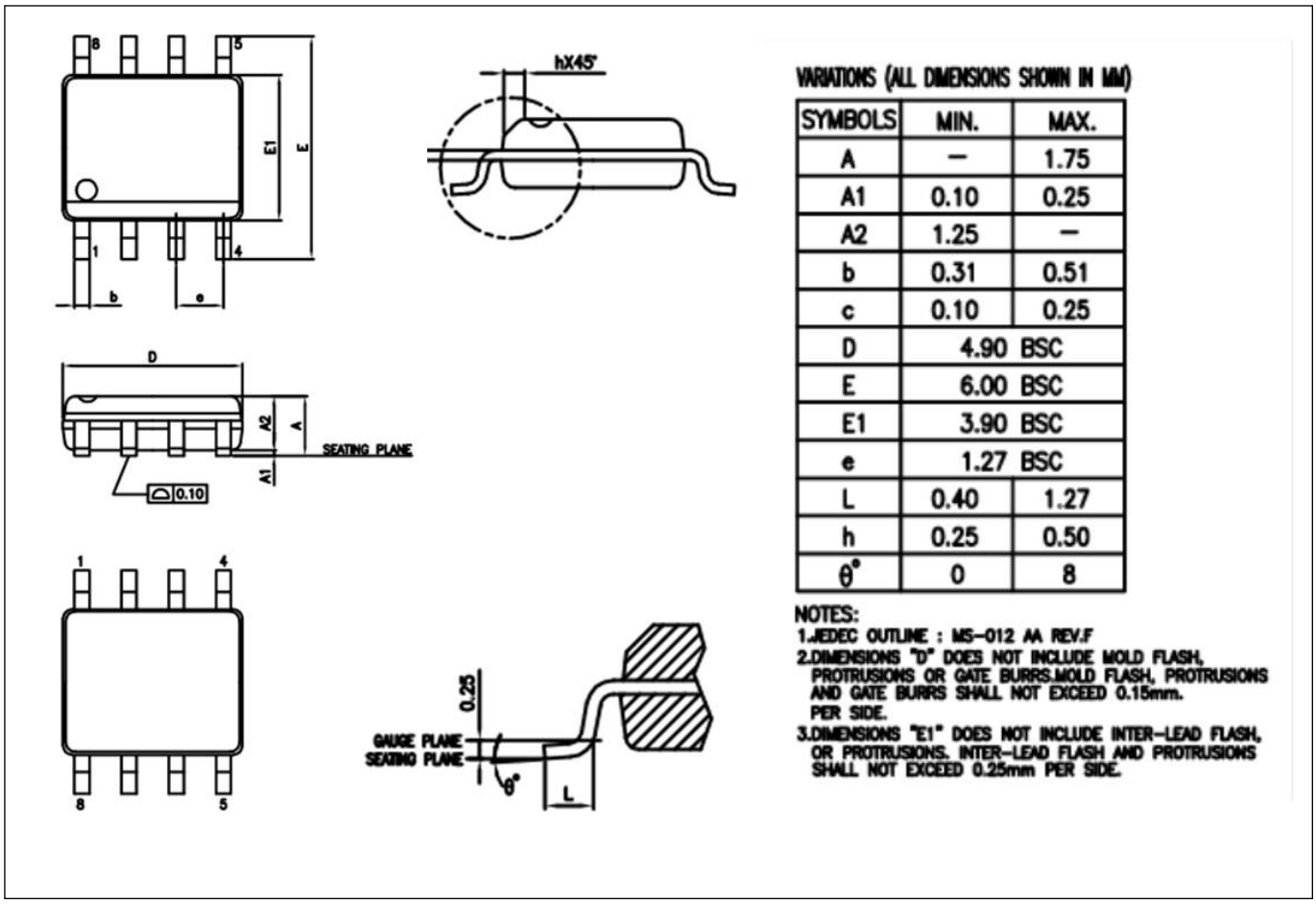
Macroblock has defined "Pb-Free & Green" to mean semiconductor products that are compatible with the current RoHS requirements and selected 100% pure tin (Sn) to provide forward and backward compatibility with both the current industry-standard SnPb-based soldering processes and higher-temperature Pb-free processes. Pure tin is widely accepted by customers and suppliers of electronic devices in Europe, Asia and the US as the lead-free surface finish of choice to replace tin-lead. Also, it adopts tin/lead (SnPb) solder paste, and please refer to the JEDEC J-STD-020C for the temperature of solder bath. However, in the whole Pbfree soldering processes and materials, 100% pure tin (Sn) will all require from 245°C to 260°C for proper soldering on boards, referring to JEDEC J-STD-020C as shown below.



Package Thickness	Volume mm^3 <350	Volume mm^3 350-2000	Volume mm^3 ≧2000
<1.6mm	260 +0 °C	260 +0 °C	260 +0 °C
1.6mm – 2.5mm	260 +0 °C	250 +0 °C	245 +0 °C
≧2.5mm	250 +0 °C	245 +0 °C	245 +0 °C

*For details, please refer to Macroblock's "Policy on Pb-free & Green Package".

Package Outline



VARIATIONS (ALL DIMENSIONS SHOWN IN MM)

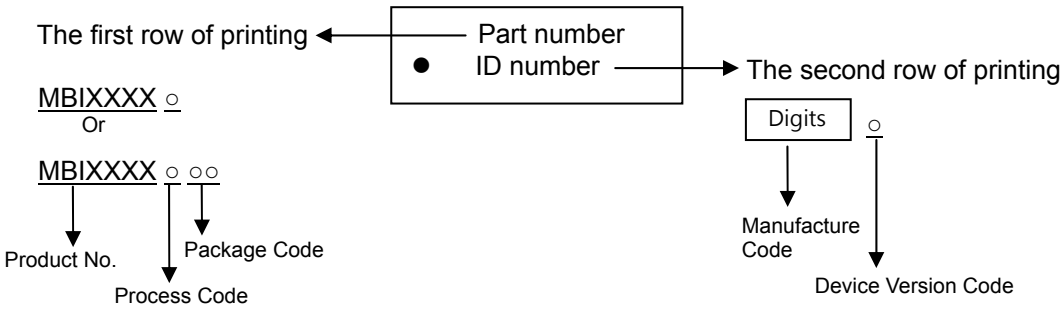
SYMBOLS	MIN.	MAX.
A	—	1.75
A1	0.10	0.25
A2	1.25	—
b	0.31	0.51
c	0.10	0.25
D	4.90 BSC	
E	6.00 BSC	
E1	3.90 BSC	
e	1.27 BSC	
L	0.40	1.27
h	0.25	0.50
θ°	0	8

NOTES:
1. JEDEC OUTLINE : MS-012 AA REV.F
2. DIMENSIONS "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 0.15mm. PER SIDE.
3. DIMENSIONS "E1" DOES NOT INCLUDE INTER-LEAD FLASH, OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED 0.25mm PER SIDE.

MBI5907GDT Outline Drawing

Note 1: The unit for the outline drawing is mm.

Product Top Mark Information



Product Revision History

Datasheet version	Device version code
V1.00	A

Product Ordering Information

Part Number	**RoHS-Compliant Package Type**	**Weight (g)**
MBI5907GDT-A	SOP8L-150-1.27	0.079

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